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EXAMINER	
LI, SHI K	

ART UNIT	PAPER NUMBER
2633	

DATE MAILED: 04/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/684,122	LENOSKY, THOMAS	
	Examiner	Art Unit	
	Shi K. Li	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1 and 3 are rejected under 35 U.S.C. 102(e) as being anticipated by Shiue et al. (U.S. Patent Application Pub. 2005/0053127 A1).

Regarding claim 1, Shiue et al. discloses in FIG. 5 an equalizing device for mitigating channel response dispersion. FIG. 5 comprises a first filter 102, a target filter 104, an error determining device 106 and a coefficient processor 108. Shiue et al. teaches in paragraph [0057] that the target filter can be a linear filter and in paragraph [0055] that the first filter may be an adaptive FIR, which is a linear filter. The error determining device calculates an error signal e(n) (figure of merit of instant claim) that represents a quality of the electrical signal and adjusts the coefficients of the linear filters via the coefficient processor 108 to minimize the error signal.

Regarding claim 3, Shiue et al. discloses in FIG. 4 and paragraph [0050] a system that updates coefficients in the frequency domain. Shiue et al. teaches to use fast Fourier transform (FFT) to convert measured value to frequency domain (i.e., spectrum of the signal).

3. Claims 1 and 4 are rejected under 35 U.S.C. 102(e) as being anticipated by Wang et al. (U.S. Patent Application Pub. 2004/0136731 A1).

Regarding claim 1, Wang et al. discloses in FIG. 5 an equalizer comprising a controllable analog filter, an error generator, error acquisition and equalizer control. Since the analog filter uses delay lines and forms linear combination of delayed signal, it is a linear filter. Wang et al. teaches in paragraph [0048] to calculate error function (figure of merit of instant claim) and adjust the coefficients of the controllable analog filter.

Regarding claim 4, Wang et al. teaches in paragraph [0063] to use low pass filter (LPF) 205 to average the error signal.

4. Claims 1 and 5-6 are rejected under 35 U.S.C. 102(e) as being anticipated by Endres et al. (U.S. Patent Application Pub. 2005/0018765 A1).

Regarding claim 1, Endres et al. discloses in FIG. 3 a linear equalizer comprising an adjustable forward filter 210 and error term (figure of merit of instant claim) calculator 230. Endres et al. teaches in paragraph [0033] to use FIR (a linear filter) for the forward filter. Endres et al. teaches in FIG. 3 to adjust the coefficients of the forward filter based on the error signal to minimize the error.

Regarding claim 5, Endres et al. teaches in paragraphs [0042] and [0043] to calculate e_{cma} based on γ which is the ratio of the fourth moment of the source sequence to the second moment of source sequence s(k) which is usually approximated by $w_e(k)$.

Regarding claim 6, Endres et al. teaches in paragraph [0084] to implement the linear equalizer using software and micro-controller.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shiue et al. (U.S. Patent Application Pub. 2005/0053127 A1).

Shiue et al. has been discussed above in regard to claims 1 and 3. The difference between Shiue et al. and the claimed invention is that Shiue et al. does not teach calculation of channel response. However, it is obvious from FIG. 3 and FIG. 5 of Shiue that the box label channel H represents dispersion and n(k) represents noise. The filters mimic the behavior of the channel and the error represents the difference between the real channel response and the effects of the filters. That is, the channel response is calculated from the effects of the filters and the error. One of ordinary skill in the art would have been motivated to calculate the channel response based on the model of Shiue because the channel response allows one to engineering the channel and predicting performance of the communication system. Such information is important for determining quality of service, data rate, etc. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to calculate channel response, as suggested by FIG. 3 of Shiue, in the equalizing device of Shiue because channel response allows one to engineering the channel and predicting performance of the communication system.

7. Claims 7-9 and 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Endres et al. (U.S. Patent Application Pub. 2005/0018765 A1) in view of Wang et al. (U.S. Patent Application Pub. 2004/0136731 A1).

Endres et al. has been discussed above in regard to claims 1 and 5-6. Regarding claims 7-8, the difference between Endres et al. and the claimed invention is that Endres et al. does not

teach an analog to digital converter. Wang et al. teaches in FIG. 5 analog filter for process signal, an analog-to-digital converter (ADC) for converting error signal to digital format and sending to a microprocessor and digital-to-analog converter (DAC) for converting signal from the microprocessor to control the analog filter. One of ordinary skill in the art would have been motivated to combine the teaching of Wang et al. with the equalizer of Endres et al. because digital computation is fast and accurate, and complex algorithms can be easily implemented and updated. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use an analog filter, ADC, DAC and microprocessor, as taught by Wang et al., in the equalizer of Endres et al. because digital computation is fast and accurate, and complex algorithms can be easily implemented and updated.

Regarding claim 9, Wang et al. teaches in paragraph [0063] to use an integrator or LPF to produce a time average value of the error signal.

Regarding claims 12-14, Wang et al. suggests in paragraph [0005] and paragraph [0076] to use the modified equalizer for mitigating modal dispersion, chromatic dispersion and polarization mode dispersion.

Regarding claim 15, Endres et al. suggests in paragraph [0003] to use the modified equalizer for mitigating dispersion in wired links using twisted-pair copper connections.

8. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Endres et al. and Wang et al. as applied to claims 6-9 and 12-15 above, and further in view of Kientz et al. (U.S. Patent 6,252,913 B1).

Endres et al. and Wang et al. have been discussed above in regard to claims 6-9 and 12-15. The difference between Endres et al. and Wang et al. and the claimed invention is that

Endres et al. and Wang et al. do not teach a capacitor as an integrator. However, it is well known in the art to use capacitor as integrator. For example, Kientz et al. teaches in col. 5, lines 20-21 that the resistor 15 and capacitor 16 of FIG. 4 form a low-pass filter or analog integrator. One of ordinary skill in the art would have been motivated to combine the teaching of Kientz et al. with the modified equalizer of Endres et al. and Wang et al. because a capacitor is inexpensive and widely available. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a capacitor as an integrator, as taught by Kientz et al., in the modified equalizer of Endres et al. and Wang et al. because a capacitor is inexpensive and widely available.

9. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Endres et al. and Wang et al. as applied to claims 6-9 above, and further in view of Kolze et al. (U.S. Patent 6,798,854 B2).

Endres et al. and Wang et al. have been discussed above in regard to claims 6-9 and 12-15. The difference between Endres et al. and Wang et al. and the claimed invention is that Endres et al. and Wang et al. do not teach to use a measured spectrum for adjusting the filter coefficients. Kolze et al. teaches in FIG. 3 to measure the spectrum of the received signal and calculate modified spectral characteristics for setting the filter coefficients. One of ordinary skill in the art would have been motivated to combine the teaching of Kolze et al. with the modified adaptive equalizer of Endres et al. and Wang et al. because it is easier to calculate spectral characteristics in frequency domain. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to calculate, as taught by Kolze et al., in the modified

adaptive equalizer of Endres et al. and Wang et al. because it is easier to calculate spectral characteristics in frequency domain.

10. Claims 16-19 and 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu et al. (U.S. Patent Application Pub. 2004/0114700 A1) in view of Wang et al. (U.S. Patent Application Pub. 2004/0136731 A1).

Yu et al. discloses in FIG. 5 an adaptive equalizer which comprises an interpolating mixer 202, phase detector 204a and integrate 206 as illustrated in FIG. 6. FIG. 7 shows the structure of interpolating mixer as a tapped delay line with correlated tap coefficients, which is a linear filter. The coefficients are adjusted based on the integration of the output of the phase detector (figure of merit of instant claim) to minimize error and improve signal quality. The difference between Yu et al. and the claimed invention is that Yu et al. does not teach to use a microcontroller for adjusting the coefficients of the linear filter. Wang et al. teaches in FIG. 5 a microprocessor for computing filter coefficients of an equalizer. One of ordinary skill in the art would have been motivated to combine the teaching of Wang et al. with adaptive equalizer of Yu et al. because a microprocessor can handle complex algorithm and calculation, and provides accurate and fast control of the linear filter. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a microprocessor, as taught by Wang et al., in the adaptive equalizer of Yu et al. because a microprocessor can handle complex algorithm and calculation, and provides accurate and fast control of the linear filter.

Regarding claim 17 and 18, Wang et al. teaches in FIG. 5 to use ADC to convert error signal to digital format for the microprocessor and DAC to convert output of the microprocessor into analog format for the coefficients for the linear filter.

Regarding claim 19, Yu et al. teaches in FIG. 6 an integrator for producing a time average of the detector output.

Regarding claims 22-24, Wang et al. suggests in paragraph [0005] and paragraph [0076] to use the modified equalizer for mitigating modal dispersion, chromatic dispersion and polarization mode dispersion.

Regarding claim 25, Yu et al. incorporates patent application no 10/244,500 (see U.S. Patent Application Pub. 2003/0189997 A1) by reference. Application '500 suggests in paragraph [0130] that the modified adaptive equalizer of Yu et al. and Wang et al. is applicable to other forms of dispersive media, which include high-speed electrical transmission lines.

11. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yu et al. and Wang et al. as applied to claims 16-19 and 22-25 above, and further in view of Kientz et al. (U.S. Patent 6,252,913 B1).

Yu et al. and Wang et al. have been discussed above in regard to claims 16-19 and 22-25. The difference between Yu et al. and Wang et al. and the claimed invention is that Yu et al. and Wang et al. do not teach a capacitor as an integrator. However, it is well known in the art to use capacitor as integrator. For example, Kientz et al. teaches in col. 5, lines 20-21 that the resistor 15 and capacitor 16 of FIG. 4 form a low-pass filter or analog integrator. One of ordinary skill in the art would have been motivated to combine the teaching of Kientz et al. with the modified equalizer of Yu et al. and Wang et al. because a capacitor is inexpensive and widely available. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a capacitor as an integrator, as taught by Kientz et al., in the modified equalizer of Yu et al. and Wang et al. because a capacitor is inexpensive and widely available.

12. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yu et al. and Wang et al. as applied to claims 16-19 and 22-25 above, and further in view of Kolze et al. (U.S. Patent 6,798,854 B2).

Yu et al. and Wang et al. have been discussed above in regard to claims 16-19 and 22-25. The difference between Yu et al. and Wang et al. and the claimed invention is that Yu et al. and Wang et al. do not teach to use a measured spectrum for adjusting the filter coefficients. Kolze et al. teaches in FIG. 3 to measure the spectrum of the received signal and calculate modified spectral characteristics for setting the filter coefficients. One of ordinary skill in the art would have been motivated to combine the teaching of Kolze et al. with the modified adaptive equalizer of Yu et al. and Wang et al. because it is easier to calculate spectral characteristics in frequency domain. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to calculate, as taught by Kolze et al., in the modified adaptive equalizer of Yu et al. and Wang et al. because it is easier to calculate spectral characteristics in frequency domain.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shi K. Li whose telephone number is 571 272-3031. The examiner can normally be reached on Monday-Friday (8:30 a.m. - 5:00 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

skl
6 April 2005

Shi K. Li

Shi K. Li
Patent Examiner